With the author's compliments.

ON INJURIES TO THE ELBOW-JOINT.

BY

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ON INJURIES TO THE ELBOW-JOINT.*

Mr. President and Gentlemen,—When your Secretary paid me the great compliment of inviting me to address your Society, I thought that I could do no better than introduce for discussion, a subject of great practical importance, concerning which strong and diverse opinions are held.

Injuries of the elbow concern us all, and we have each of us, I venture to think, had our moments of anxiety in our attempts to steer a badly damaged elbow through dangerous seas. In my own practice I meet with a large class of patients, young and old, in search of more useful arms, many of them stiff at awkward angles, and some with a limited range of movement in a position which renders the arm of little use. I desire, therefore, this evening, to deal with the damaged elbow in its clinical aspect, to emphasize certain points in diagnosis, to simplify treatment, and to warn my medical friends of the dangers which attend the use of splints.

*Delivered before the Wigan Medical Society.

In the old days there was considerable difficulty in testing our diagnosis, and this often led to unwarranted dogmatism on the part of the surgeon, who felt himself in the position of one who could not be contradicted. Even in those days, however, we must have felt in our introspective moments the real difficulties which beset us, and that the anatomical precision with which we described our injuries was hardly justified by the knowledge we possessed. Indeed, the larger our experience, the more exact our knowledge and the less detailed our diagnosis ; and we generally left our junior house-surgeon, fresh from the anatomy-rooms, to describe the displaced fragments, the aspect of facets, the angles of obliquity and the rotatory changes, in cases which to some of us strongly suggested a simple dislocation. The advent of the X-rays, however, has changed all this, has added immensely to the accuracy of our knowledge, and to the classification of our cases, and has saved our patient from much unnecessary and often aimless manipulation. We must beware, however, that we do not paralyse our diagnostic faculties from pure inanition. Röntgen rays should supplement, not usurp, other means at our disposal. Until we become familiar with common types of elbow injuries, each case should be anæsthetised, and our impressions recorded, and if we be sufficiently fortunate to possess a Röntgen screen, it may be used to correct or confirm our conclusions. In this way we may educate our powers of diagnosis and become much

more competent to do good work in this important branch of surgery. In this connection I must refer to the common fallacy that radiographs are like photographs, and have only to be looked at to be understood. In young children it is impossible in quite a number of cases, despite excellent pictures, to diagnose elbow fractures by means of X-rays, and here our tactile education is invaluable. The reason for this is obvious ; for at this period the articular ends of the bones are cartilaginous and transparent ; and apart from an odd ossifying epiphysis, we merely find a clear space of considerable extent, between the arm and forearm, which certainly may contain fractures, though they are not at all distinguishable in the negative. From this you will note that while we gain in clinical accuracy from radiography, it has its sharp limitations, and, often for its correct interpretation it borrows aid from the clinical side. Even in later life, where apparently the picture is complete, the greatest care combined with much experience is necessary before its lesson can be learned ; and very rarely can we look upon X-ray pictures of infantile elbows and say " In this case there will be movement, in this a limited range, in this none." May I say one word in passing, viz., that all students should be taught X-ray work as a part of their curriculum, and that practitioners should no more allow so important an aid to diagnosis to fall into unqualified hands, than they should the use of the stethoscope. In this respect our metropolitan

colleagues are most to blame ; for in spite of the existence of many experts in this department, most of the pictures that are brought to me bear the names of instrument-makers, electricians, and wholesale chemists. This should all be changed.

I will now touch lightly upon a few points in the anatomy of the elbow-joint which may bear upon diagnosis. Important amongst these from their relationship to X-rays, are the centres of ossification and the fusion of epiphyses. The centre for the shaft of the humerus appears early in fœtal life ; ossification of the capitellum, or lesser head begins in the third year ; it appears in the internal condyle about the fifth year ; in the twelfth year in the trochlea ; in the fourteenth year it appears in the external condyle, and they all unite together to form an epiphysis at the lower end of the shaft. The lower epiphysis unites to the shaft at puberty, while, as we know, the upper end is detached until maturity. The practical bearing of this is that while we cannot separate our lower epiphysis later than the sixteenth year, our upper epiphysis may be detached up to the age of twenty-one.

The upper end of the radius begins to ossify at the fifth year, and is united at the seventeenth.

The coronoid process of the ulna shares a centre of ossification with the shaft. The olecranon has a separate centre and is cartilaginous until eight, and it unites at puberty.

Movements.—Normally there is no lateral move-

ment in the elbow-joint, but merely flexion and extension, a movement that ranges about 140°. Extension and flexion are limited by the tension of soft structures, and not by contact with the respective fossæ of the coronoid and olecranon. The bony structures check forced but not voluntary motion. A point of great practical importance for diagnostic purposes is, that if the arm be extended, a line drawn from one condyle to the other passes over the tip of the olecranon. This is as useful a line to us as that of Nelaton in the hip. If the elbow be flexed to a right angle the olecranon lies a little more than one inch below and not quite half-way between these two points, being a little nearer to the internal condyle.

While the line of the humero-radial joint is horizontal, the humero-ulnar joint slopes obliquely downwards. This fact makes the axis of the extended forearm diverge outwards at an angle of about 6°, giving rise to the so-called carrying angle of the elbow. This angle disappears when the hand is pronated. The same anatomical fact will account for the pronated hand being carried towards the face in flexion, and to the outer side in supination.

Of the ligaments the internal lateral is the most important and resistant. It limits both flexion and extension and resists lateral yielding. Were it not for the lateral ligaments, fractures of the olecranon would invariably exhibit great deformity ; but their attachments, more especially that of the

internal to the border of the great sigmoid cavity of the ulna, prevent a wide separation. In those instances where a wide separation exists, we may be sure that the ligaments have been completely ruptured. Of the capsule we need but remember that its two thin aspects are at the front and at the back, and that effusions due to sprains present as two pouches each side of the olecranon, *viz.*, at the upper part of the radio humeral joint and also beneath the brachialis anticus.

A severe sprain of the elbow seen early is not difficult to diagnose. The joint is swollen, tender, and fixed at an angle of about 55° ; the three bony points bear their correct relationship. There is a fulness at each side of the olecranon, and easy gliding movement in the joint within its limited range. All attempts at voluntary movement give rise to pain. Pressure over the lateral ligaments is borne with difficulty. Lateral movements of the elbow may be present, due to rupture of one or both lateral ligaments. The condyles, epiphysis, head of the radius, and olecranon are firm.

To recent dislocations I shall make but a reference. They are generally easy of diagnosis and not insuperably difficult to reduce. The points to go for—and they can all be felt—are the condyle, the head of the radius, and the olecranon. In the backward displacement of both bones there is a fulness in front, just below the bend of the elbow. The joint is usually flexed at an angle of about 140°. The head of the radius is very super-

ficial to the outer side of the olecranon and behind the external condyle. The forearm is shortened anteriorly and broadened ; in its upper part there is deviation of the axis of the arm, limited flexion and extension, and a varying amount of lateral movement. This dislocation is due to a fall on the hand, and the elbow is thereby hyper-extended, and usually abducted. I have seen it on a few occasions occur in the company of a Colles's fracture. During hyper-extension of the arm the olecranon presses into the fossa and wrenches the ulna from the humerus ; the lateral ligaments are torn and the coronoid process is forced behind the trochlear surface. In this common form of dislocation, which we all know so well, there are often complications ; the most common of these are fractures of the olecranon and coronoid, of the tip of internal condyle, or of the head of radius. I have seen cases illustrating each of these accidents.

The other dislocations are less common ; they consist of two lateral displacements, a forward variety of a rare kind and an interesting form from the point of view of diagnosis ; I mean displacement of the radius forwards. The lateral varieties are rare, because of the strength of the lateral ligaments ; the backward displacement is common because of the weakness of the posterior part of the capsule ; the forward displacement is very rare because of the position of the olecranon.

Dislocation of the head of the radius forward is

an interesting injury. We come across it in early days under the name of *subluxation* of the radius. A small child is brought to us with a painful elbow, held almost extended and semi-proned. The arm can be freely flexed, but there is some limit to supination. The injury is almost always inflicted by a pull upon the arm, accompanied by abduction or adduction. The mother pulls the child's arm to hurry it along, or swings it over an obstacle, or gives it a sudden tug to lift it out of danger. In this way the head escapes more or less completely from below the orbicular ligament. The more complete dislocation, however, which occurs in later life, is often due to a blow from behind while the arm is pronated, to a severe twist, or to a fall on a pronated arm. The head can be plainly felt situated forward and inwards. The three bony points maintain their relationship. There is limited supination. The head of the radius moves with the shaft, and flexion at the elbow is abruptly checked. Such an injury is by no means uncommon, and I have frequently come in contact with old cases where the head of the radius is displaced *outwards* and *forwards* and where no limitation of movement exists in any direction. The treatment of these cases I will allude to presently.

For all clinical purposes, the classification which will suit our purposes best may be simplified and tabulated as—

(1) Fractures of the external condyle.

(2) Supra-condylar and condylar fractures.

(3) Fractures of the internal condyle.

Fractures of the external condyle are fairly common. Out of my last tabulated 121 cases of injuries about the elbow, 21 instances of this fracture appeared. The line of fracture follows the epiphyseal line fairly closely ; it runs from above the epicondyle into the joint in the vicinity of the trochlear groove, and it carries with it a small portion of the diaphysis. The condyle is displaced upwards, not usually far, by reason of its ligamentous attachments, but one often notes both a rotation and a flexion of the fragment. There is a swelling, more especially on the outer side of the elbow, crepitus, mobility, impairment of flexion (impaired movement feared). The relationships of the three points of bone are altered, the transverse diameter on the injured side being increased. This injury is due generally to a fall on the flexed elbow.

Of the internal condyle, fifteen out of 121 were found separated. The line often begins above the epitrochlea to the centre of the elbow-joint. The ulna is attached to the fragment and both the condyle and the ulna are held in fair position by the radius. The interference with the three bony points is therefore not great. The olecranon maintains its relationship to the internal condyle, and is inappreciably altered in regard to the epicondyle. If there be displacement upward, the carrying angle will be diminished.

Separation of the complete lower epiphysis is unquestionably rare, and of 121 of my cases, only one could be positively diagnosed, even with X-rays, as an undoubted instance. Eighteen cases are labelled as supra-condyloid fractures, and in most of these the fracture follows the line of epiphysis, but the epiphysis carries with it also some of the posterior portion of the diaphysis. Should it occur, it is most likely to do so before the age of three, at a time when it is quite easy to forcibly produce it on the cadaver. In the majority of supra-condyloid fractures, the break occurs above the epiphyseal line. The diagnosis of supra-condyloid fracture is often confounded with backward dislocation of the elbow. In both cases there is prominence at the bend of the elbow, a prominence of the olecranon posteriorly, lateral mobility at the elbow. In the fracture, however, the three bony points maintain their relationship, and crepitus can be elicited on reduction, while displacement is very apt to recur unless the arm be immobilised.

Fractures of the head of the radius are common in my experience. Out of 121 X-rays, I find ten fractures of the head and two of the neck of the bone. The displacement is usually outwards and forwards, and is liable to be mistaken for a small piece of the external condyle. Supination and pronation are both limited, while the elbow can be almost fully extended and flexed.

So much, gentlemen, for the differential diagnosis of these, the main injuries to the elbow-joint. If they

are seen immediately after injury, the difficulties are not great, but we are all of us likely to make mistakes in the stage of serous and hæmorrhagic effusion. This is the case even when our patient is under an anæsthetic, and our examination can be made at ease. Without anæsthesia the difficulties are greater still, and the problems we have to solve are (*a*) When are we to reduce the deformities, and how? (*b*) Is there any routine method of treatment which we should adopt until, by X-rays or otherwise, our diagnosis may be made more certain? Both questions may be easily and emphatically answered. The deformities must be corrected without delay, and there is a routine method of treatment which should be adopted in all doubtful cases. For many years there has been too great a tendency to fix injured elbows in angular splints, closely applied and firmly bandaged, and but little attention has been paid to forestalling by flexion the limitations of movements, which the exudation of callus entails. Splints are tightly fixed before the swelling appears; tension is intensified from outside pressure; splints are removed and reapplied, the arm and hand swell, and disturbances of circulation are potent factors in opposition to recovery. In 1892 and 1894 I introduced to the profession, the position of acute flexion as a safe routine in the treatment of grave elbow lesions, a position which clinical experience had for years taught me to be productive of almost uniformly good results. In 1894 I wrote:

"Some years ago, feeling dissatisfied with the outer and inner rectangular support then and even now in vogue, I introduced the posterior rectangular thin sheet-iron splint, with the kettle handle interruption at the elbow. This allowed of a much more careful adaptation of fragments, and was so constructed as to lessen the need of tight bandaging. This splint, which met with a favourable reception at the hands of surgeons, I now very rarely use—indeed, I may say only in those cases of compound fracture with loss of bone where dressings have to be combined with rigid fixation and where ankylosis may be confidently expected. During the time I used the splint I was unfortunate enough to meet with two bad results. The one was a case of condyloid fracture in a boy æt. 14, which, at the end of six weeks, seemed fairly ankylosed; and the other in a girl æt. 12, who, at the end of five weeks, after simple backward dislocation with apparently no complication, exhibited firm ankylosis to flexion and extension, but permitted supination and pronation. In the first case I forcibly extended, supinated, and then acutely flexed the elbow. I applied a bandage round the neck, and for three or four weeks kept it so without indulging my curiosity to the extent of making an examination. My second case was treated in similar fashion, and both made good recoveries with excellent motion. My object in acute flexion was in the first case to secure for the bones a position sufficiently changed to lessen the risk of a reuniting of old adhe-

sions, and at the same time to attain for the articulation absolute rest after its manipulation. The late Mr. H. O Thomas, with whose practice I was intimate, advocated a flexed position, a little less than 45°, in the treatment of his tubercular elbows, and his results I have never seen equalled. These results were brought about, I am convinced, by reason of the fact that no constrictions in the shape of splint and bandage interfered with the physiological activities of the joint. This factor of splint and bandage has, in my opinion, much to answer for in the stiff joints which follow injury ; a week never passes without my seeing some child, several weeks after accident, with a stiff and useless elbow. Hardly one of these cases but gives the usual history of rectangular splints, pads, bandage and early passive movements. I used to experience similar results until my observations of Mr. Thomas' tubercular cases led me to adopt the acutely flexed position for all injuries of the elbow, excepting fracture of the olecranon. The treatment I would advocate, then, is that all injuries of the elbow excepting fracture of the olecranon should be fixed at an acute angle, and kept there until all inflammatory symptoms have subsided. This routine should be adopted whether an accurate diagnosis has been made or not, for I find it is only those gentlemen of very limited experience who never fail to diagnose an elbow lesion."

Ten years have passed since this was written, and my additional experience confirms me in the

accuracy of the views I then expressed Many of my surgical friends at home and abroad have written to me confirming good results, and acute flexion of the elbow is now slowly becoming recognised as a simple and effective way to treat these serious injuries It is not generally a commendation to describe any method as a routine, more especially when applied to injuries of widely diverse kinds, and I should like to briefly amplify my arguments in favour of acute flexion. My practice, as you know, is largely concerned with fractures, generally old fractures, which are supposed not to have resulted well. Amongst the injuries of this kind, deformities and disabilities of the elbow are perhaps the most common of all. The deformities, whether the result of supra-condyloid fracture, separation and rotation of condyle, or backward dislocation, were almost invariably identical. They consisted of flexion of the arm at an angle of about 120°, with varying degrees of movements or none at all. On examining the elbow in supra-condyloid fracture, the prominent lower end of the diaphysis assisted by new bone blocked the arm to flexion. In so-called T-shaped fractures diagnosed by careful surgeons similar conditions obtained. In neglected dislocations the etiology of the deformity was obvious. In short, callus exudate, bony displacements, and organised effusions opposed flexion, whether the arm were treated by splints in the straight or in the rectangular position.

Recognising this, I instructed my house-surgeons in all cases of fracture and dislocation, with the exception of fracture of the olecranon, to first of all supinate and acutely flex the elbow and not to be content until flexion was secured.

In subluxation of the radius, supination and flexion audibly reduce the displacement, and the arm is kept for a week acutely flexed. Should we be dealing with a sprain, no position could be better to secure for it than that of flexion, until inflammatory symptoms have subsided. In cases of separation of the epiphysis or supra-condyloid fractures I again supinate, extend, and flex ; for one can thus effectively combat the backward dislodgement of the epiphysis. It has been suggested by certain writers who follow this method in separation of the condyles and supra-condyloid fractures, that the acutely flexed position is liable to produce a forward displacement of the epiphysis. Even if this be so no harm can come of it ; for callus exudation is not obstructive at the back, and there will be no sharp prominence of the lower end of the shaft to do harm in front.

I have often placed the arm in position aided by the Röntgen screen, and the position assumed by the epiphysis when acutely flexed has always seemed satisfactory. If the forearm be dislocated backwards, we must extend and supinate and acutely flex, for in this way only can we reduce the dislocation ; and should we be unable to flex the arm, we may rest assured by such failure that

the displacement still remains. If the radius is dislocated forward and inward, a similar routine is effective ; the supination and extension will reduce the luxation, while acute flexion will maintain it in position. If the fracture be inter-condyloid, the position of acute flexion has this advantage, that it secures for the forearm at once a right of way, before exudation of callus and displaced condyles can prove obstructive. Should the injury be separation of the internal epi-condyle, there can be no better way to keep it from the common downward displacement, than by acute flexion to relax those muscles which pull upon it. In supra-condyloid fractures, if oblique, the rectangular position does not prevent over-riding of the shaft ; and it is quite possible to only very imperfectly reduce a dislocation of the radius or the forearm, while the limb may be comfortably ensconced at right angles.

At this stage I should like to draw your attention to the production of sham reductions exercised upon old cases of backward displacement of the forearm. As you know, an ancient dislocation of the elbow is difficult to reduce. I have succeeded in a few cases after two months ; I have failed in some as recent as a month. In these cases, however, it matters but little whether one fails or succeeds, for an equally good range of movement can be secured by a sham as by a real reduction. A patient, young or old, is brought to the surgeon with a history of some months. Both the ulna

and radius are displaced backwards, the arm slightly flexed, with only a few degrees of motion. In making a sham reduction we endeavour to bring the arm into a flexed position for two reasons : In the first place, it is more useful there ; in the second place, the olecranon process is nearer its normal habitat, and the range of movement will be increased. Ether is administered, and slowly but forcibly slight flexion is attempted. This may prove difficult and require much power. When a certain degree has been accomplished and the surgeon feels that a fracture might follow more, the arm is fixed in that position for a few days and again an anæsthetic is administered. Quite easily by this time a few degrees more can be attained, and the operation is repeated until at length acute flexion results. The arm is then kept in this position for two or three weeks, passive movements avoided, and under suitably applied tests, to be again referred to, the joint is released. Almost equally good results will be recorded in old cases of neglected supra- and intra-condyloid injuries. The method is very gratifying when applied to old and apparently hopeless cases. A very strange complication is liable in rare instances to follow dislocations. I have noticed it in several instances, but can give no adequate explanation. Jonathan Hutchinson described a case in 1899, under the title " Case of Myositis Ossificans following Injury," and another in the same year was exhibited at the Clinical Society by Frederick Eve entitled, " Case of Myos-

itis Ossificans Traumatica." I can show you three radiographs exhibiting this condition which may or may not be analagous to myositis ossificans ; these cases may be mistaken for ossifying sarcomata.

Many years ago, after fracture of the external femoral condyle, I removed a piece of bone which exhibited all its characters, and which the patient insisted had been growing for two years. It was situated in front of the biceps tendon, was only attached by fibrous tissue to neighbouring parts, and apparently there was no deficiency in any portion of the condyle. This was before the advent of X-rays. Some five years ago I removed a piece of bone the size of a crow's egg from the front of the triceps, the growth of which followed a backward dislocation of the forearm. In the three cases which I show you on the screen, the bony deposits unquestionably followed dislocation and not fracture. I believed that new bone was thrown out from the torn periosteum and effused blood, but quite possibly the cases represent a local form of myositis ossificans.

An interesting deformity which follows certain fractures is that known as " gun-stock deformity." It is an adduction of the forearm which is apt to follow fractures of the internal condyle, and transverse fractures through or above the condyles. It may be so slight as to merely obliterate the carrying angle ; it may be so marked as to give rise to a deformity analogous to a pronounced knock-knee. The position of the elbow which possibly best

prevents it is the fully extended one, but this position presents so many dangers that it cannot for an instant be recommended. About twelve years ago, when surgeons frequently adopted this method, I had many opportunities of reflecting on its defects. I saw two cases of ankylosis in the fully extended position, and in over a dozen cases I had to remedy, by forcible manipulation, arms fixed at obtuse angles. Wright had to resect in five cases treated by this method. Other surgeons have reported equally disastrous results. Clearly, therefore, the extended position has dangers of no inconsiderable kind. I have seen unmistakable gun stock deformity in slight degree following separation of the internal condyle, although in the majority of instances it is associated with trans-epiphyseal or supra-condyloid injuries. The causation is obviously a change in the direction of the line of articulation. Practically the deformity is governed if the elbow be kept sufficiently long in a flexed position for the consolidation of the fracture to take place. I state this from my observation, that cases at the third or fourth week displaying no such deformities subsequently exhibit them after they have freely used their arms. The lesson to be learnt from this is either to keep the elbow acutely flexed in supra-condyloid injuries for four or five weeks, or to keep the released arm under observation and correct the deformity when it is first observed. If you question parents regarding it, they generally tell you that for the first two or three weeks the

deviation has increased after the arm has been released from restraint. In a very comprehensive article ably contributed to the Annals of Surgery by Cotton of New York, he described certain experiments on the cadaver with the purpose of aiding the solution of the problem as to the position of the arm. He experimented upon three arms of newly-born babies whose humeral epiphyses he detached. Speaking of the displaced epiphysis in the first place, he says, " Readily reduced and firmly held in position of acute flexion, much less well in extended position, and only fairly well at a right angle." Of the second case he writes, " Position firmly retained in acute flexion, less well at a right angle or in extension." Of the third case, " Position of reduced epiphysis fairly retained in the straight position or at a right angle, though not without lateral mobility. In acute flexion the epiphysis is sharply displaced forward."

His experiments on the cadaver of a child æt. 6 were very interesting. In the first instance he obtained a supra-condyloid fracture. On attempting to reduce the deformity, he found that extension of the arm produced a marked backward displacement. At 135° the same backward displacement. At 90° the fragments were in fair position, but on manipulation, backward, valgus, and rotatory displacements were all possible. In acute flexion there was a definite forward rotation of the epiphysis, but backward displacement and rotation in the direction of valgus or varus were

quite impossible. In fracture of the external condyle case 4 (*a*), he states that in this position (acute flexion) displacements are more easily reduced and retained than in the others tried. In case 5 violence resulted in a supra-condyle break, and referring to the acute position, Cotton says, "There was in this specimen no forward rotation, and the fragments were, as before, locked against all displacements." Scudder, in his last edition of 'Fractures,' says that experimental evidence, both on the living and dead, "confirmed by clinical experience," demonstrates that the acutely flexed position actually reduces and holds reduced fractures of the internal epicondyle, of the internal condyle, of the external condyle and T fractures into the joint. "In the acutely flexed position the coronoid process in front, the trochlear surface of the olecranon behind, and the fasciæ posterior and laterally, together with the tendon of the triceps posteriorly, hold the fragments reduced and close to the shaft of the humerus."

Experiments quite as effective, and I think more reliable than those of Cotton, can be made with an X-ray screen. Factors come into play in the living elbow which are quiescent in the dead. I have compared by the aid of a good X-ray tube the relative advantages of different positions, and I have had no reason to regret my advocacy of the acutely flexed position. I advocate it not merely because good apposition is maintained, but because a right of way is secured to flexion, before callus exudation

can prove obstructive. This cannot be said of any other position.

To any of us who come in contact with old elbows a remarkable fact must have been observed. Some of the ugliest elbows present admirable movement, while many elegantly shaped joints are practically destitute of it. This is important, and suggests that after all operative methods by means of screws and silver wire may fail to be convincing ; and already I have come in contact with an ankylosis following the wiring of fractured condyle, and a very limited range of movement following a wired inter-condyloid break. Both elbows, however, looked well. I find it wise to tell an anxious mother, when I am dealing with an inter-condyloid fracture, that, while good movement may be counted upon, a widened elbow may result. She never hesitates in her choice between a well-shaped elbow with possible marked limitations of motion and a more homely, if more useful joint.

I have no time to deal with the interesting question of operations for malunited fractures. I have removed obstructive condyles, exuberant callus, the heads of displaced radii and the well-known sharp and prominent overhanging diaphysis in unreduced supra-condyloid fracture. Such operations are often necessary and generally successful. In recent fractures about the elbow, save in compound cases, operations, I am sure, are quite uncalled for. There are, however, certain

cases of ankylosed fractures, the result of severe injuries, where the arm is left hopelessly stiff. For such cases nothing short of excision will suffice ; but we must bear in mind that a limited range of movement is preferable, if combined with strength, to free movement with flail tendencies. Herein lies the danger of excisions performed upon sound but deformed elbows.

" How long is the arm to remain in the sling ? " Until consolidation is practically complete and until all traumatic inflammation has subsided. In a badly injured elbow this means about four weeks or even longer, in a bad sprain about ten days, in a dislocation a fortnight. The progress of the joint may be tested in a very simple way. Let us by way of example take the case of a bad condylar fracture. The arm is acutely flexed for a fortnight. The surgeon, at the end of that time, if the elbow looks encouraging, drops the slung wrist a couple of inches and fixes it there. If on his next visit in a couple of days the patient is able voluntarily to raise his wrist back to the point from which it was dropped, all is well. If not, the arm is again acutely flexed. I never adopt very early passive movements, and I am pleased to find that men of large experience in many cities are finding out how much they obstruct Nature by their attempt at hurry. When the joint has recovered and a few weeks have elapsed, then massage and passive movements may be safely advised, and if a nervous child will not practise movements, forcible exten-

sion and the application of a splint for two days will meet the indication.

Are my results universally good, *i.e.*, perfect, with regard to movement ? No ! In recent cases they are always good and often perfect. If ankylosis occurs in children, it is due to faulty surgery and the vicious union of fragments. Passive movements could not influence the result. In trans-condyloid and supra-condyloid fractures there may for many months be a limitation to complete extension. If appropriately treated, flexion is assured from the first. You will do well to tell parents this and save them from discontent.

Let us remember, however, that the range of movement after elbow injuries in children will increase for many months, and elbows which many weeks after injury possess but few degrees of movement, may in some months exhibit almost complete mobility.

The method of reduction I recommend has at least the merit of simplicity ; it requires no expert knowledge, it is not dependent upon X-rays, and I venture to urge that, more important still, it will yield good results.